Ecology and conservation of ground-dwelling beetles in managed wet eucalypt forest: edge and riparian effects

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Submitted in fulfilment of the requirements for the degree of Doctor of Philosophy,

School of Zoology, University of Tasmania, November 2006

Declarations

Statement of originality

This thesis contains no material that has been accepted for a degree or diploma by the University or any other institution, except by background information and duly acknowledged in the thesis. To the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due acknowledgement is made in the text.

Susan Claire Baker

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Susan Claire Baker

Abstract

Limited understanding of the ecology of ground-dwelling invertebrates in Tasmania has hampered our ability to assess the adequacy of forest management. This thesis documents the distributions of ground-dwelling beetle assemblages in managed, wet eucalypt forests of southern Tasmania, and explores the response of beetles to ecological gradients caused by riparian influences near small streams (since retained riparian corridors are a major conservation tool), and edge effects from recently clearfelled logging coupes. Extensive pitfall trapping using replicated transects at four sites was employed to compare the beetle fauna between five habitats: young logging regeneration, the interior of upslope mature forest, the riparian-upslope transition in mature forest interior, and across coupe edges (both into upslope mature forest and into streamside reserves). Data screening ensured that the primary transect design, which employed traps positioned at unequal distances within transects, was unlikely to produce patterning in beetle distributions attributable to spatial autocorrelation or pitfall trap depletion.

Beetles responded to riparian influences, showing subtle shifts in assemblage composition, and generally reduced abundance or species richness nearer to streams. However, site differences outweighed riparian effects. Beetles assemblage composition differed substantially between young logging regeneration and mature forest: several species were identified as indicators of each habitat. Beetles responded more strongly to edge effects than to riparian influences. Depth of edge influence extended ~ 22 m into unlogged non-riparian forest, but further into streamside reserve edges (up to ~ 65 m). Four beetle species, *Choleva* TFIC sp 01 (Leiodidae), *Decilaus nigronotatus, D. lateralis* and *D. striatus* (all Curculionidae), were indicators of mature forest interior.

A second survey compared beetles between logging regeneration, upslope mature forest interior, mature forest interior riparian areas, and streamside reserves that had been logged on both sides, in five stands of each of the four habitats. Streamside reserves (average width 40 ± 6 m (± 95% CI) from reserve edge to stream) supported different beetle assemblages to unlogged areas, and were probably entirely edge-effected.

These results suggest that current corridor provisions, which rely heavily on riparian reserves, may be inadequate to conserve beetles dependent on mature forest interior. Reserve corridors may need to be wider, and should more often be positioned upslope away from riparian areas. Alternatively, a mix of different types of reservation strategies (e.g. conserving some contiguous blocks of mature forest in lieu of widened corridors) needs to be developed to increase the probability that edge-sensitive and mature forest specialist taxa will be conserved.

Acknowledgements

Many people and organisations have supported this research, and acknowledgements are given at the end of each chapter. I received a University of Tasmania Postgraduate Scholarship, and a top-up scholarship from the CRC for Sustainable Production Forestry. To supplement funding from The University of Tasmania, fieldwork was supported by the following grants: a Forestry Tasmania Warra LTER Small Projects Grant, a DPIWE World Heritage Area Grant, and a Maxwell Ralph Jacobs Fund Grant. Funding from Forestry Tasmania provided a scholarship extension to sort and identify beetles collected in the second field trial. FWPRDC and the Geography Student's Society provided travel grants to attend international conferences.

I am enormously grateful to my supervisors for their efforts throughout this project. My primary supervisor Alastair Richardson and co-supervisor Leon Barmuta have been fantastic supervisors during all stages of the project. I am grateful for their guidance, knowledge and experience, their proofreading efforts, and also for allowing me the autonomy to follow my own pathways of interest. I am also grateful to Leon for his patience in sharing his statistical expertise, particularly in getting me started using R. Simon Grove, although not a supervisor on paper, assisted greatly with many aspects of the project, including editing many of the draft manuscripts, and I was very fortunate to gain from his forestry insights and knowledge of beetles. I also appreciate the effort and enthusiasm of my research supervisor Peter McQuillan.

I was very fortunate to receive voluntary assistance with pitfall trap sorting from a number of people, making this large job both easier and more fun. In particular, Isabel Jaisli, Matt Lansdell, Tegan Kelly, Russel Lewis-Jones and Stewart

Alexander dedicated themselves for substantial contributions to this task. Luke Einoder, Marie Yee, Gab Warren, Isabel Jaisli and Tegan Kelly helped with field work. Help with beetle identification was given by Peter McQuillan, Owen Seeman, Karyl Michaels, George Bornemissza, Tom Weir, John Lawrence, Simon Grove, Marie Yee, Rich Leschen, Belinda Yaxley, Dick Bashford and Ainsley Seago. Attendance at an ANIC beetle identification course greatly assisted the task of family identification of beetles.

Forestry Tasmania, and the staff of their Geeveston District and Research and Development Division were extremely supportive of this project. As well as help with funding, they provided field support including the use of a caravan at the Warra LTER site, advice on study design and field sites, help with GIS, access to and assistance with the Tasmanian Forest Insect Collection. Thanks to Simon Grove, Dick Bashford, Rob Taylor, John Hickey, Mick Brown, Tim Wardlaw, Belinda Yaxley, Joanne Dingle, Carolyn Ringrose, Peter Ladaniwskyj, Alison Wooley, and staff at the Geeveston Workshop and the Geeveston Forestry Office.

I would like to thank the support staff of the School of Zoology, including Sherrin Bowden, Kit Williams, Wayne Kelley, Barry Rumbold and Kate Hamilton. The University of Tasmania Science Library and Document Delivery Service were both extremely helpful. I also appreciate the friendship and support of my fellow PhD and honours students, especially Bonnie Lauck, Iain Field, John Gooderham, Derek Turnbull, Penny Atkinson, Grant Westphalen, Pep Blanks, Marie Yee, Tilla Roy, Beth Strain, Gab Warren, Jed Macdonald, Abe Miller, Amy Koch, and long-term room mates Rick and Jemina Stewart-Smith.

Statistical analysis at times proved challenging, and I am very appreciative of the help given by Leon Barmuta, Russell Thompson, Alastair Richardson, Simon Grove, Marie Yee, Marti J Anderson, Russell Millar, Graham Edgar and Ann

Watson. I also received advice and help from Paul Scofield, Penny Atkinson, Bonnie Lauck, Ann Wilkinson, Philip Pennington, Philip Smethurst, Neil Davidson, Caroline Mohammed, Karyl Michaels, Sarah Munks, Clare McArthur, Steve Candy, David Ratkowsky, Pep Turner, Greg Brenner, Mamoru Matsuki, Don Driscoll and Tom Weir. During my candidature I was able to enroll in undergraduate courses in quantitative methods and entomology at the University of Tasmania, providing helpful background to my PhD studies. Leon Barmuta, Craig Johnson and Geoff Allen were excellent teachers in these subjects.

I am grateful to organisations and individuals that hosted me in visits away from Tasmania. In Canberra I stayed with Noel Starick, Chris Lambkin and Chris Palmer when attending the ANIC beetle ID course. In New Zealand, Paul Scofield and the Canterbury Museum hosted me for one month. In Brisbane I stayed with Helen Nahrung and Owen Seeman while attending ICE2004, and for a one-month fellowship with the Queensland University of Technology. In Montreal I stayed with Benoit Friceau whilst attending ESA/INTECOL2005. Thanks also to Mum and Gedgar for donating frequent flyer points to help me get to Canberra and Canada respectively.

To Mum, Wendy and Gedgar, thanks so much for your love, support, and financial help. A big thanks also to my friends for their patience, support and companionship. I would especially like to thank my friend Marie Yee, with whom I shared the PhD journey through similar projects. Marie assisted in many ways, but I especially appreciate her help setting up my Access database, and her help with identifying beetles. It was great to hang out with someone who understood what I was talking about when I said that pselaphines were cute. I am also very grateful to Helen Nahrung and Owen Seeman who were my field-work safety contacts, frequently also adding in bonus dinners when I returned from the field.

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